

CLAIMS

What is Claimed is:

1. A positioning device for positioning a tool, the device comprising:

a base having a length extending along a first horizontal axis;

5 a first arm coupled to a first carriage and extending therefrom along a second horizontal axis perpendicular to the first horizontal axis, the first carriage coupled to the base and configured to move across the base along the first horizontal axis;

a second arm pivotally coupled to a second carriage and extending therefrom along a vertical axis, the second carriage coupled to the first arm and configured to

10 move across the first arm along the second horizontal axis, the second arm configured to pivot about a first rotational axis parallel to the first horizontal axis; and

an extending arm coupled to the second arm and parallel therewith, the extending arm configured to move across the second arm along the vertical axis and further configured to rotate about a second rotational axis parallel to the vertical axis.

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2. A positioning device according to claim 1, further comprising:

a first movement device associated with the base and configured to move the first arm along the first horizontal axis;

a second movement device associated with the first arm and configured to move
20 the second arm along the second horizontal axis;

a third movement device associated with the second arm and configured to pivot the second arm about the first rotational axis;

a fourth movement device associated with the second arm and configured to move the extending arm along the vertical axis; and

a fifth movement device associated with the extending arm and configured to rotate the extending arm about the second rotational axis.

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3. A positioning device according to claim 2, wherein one or more of the movement devices comprise handles associated therewith to implement the corresponding movement device.

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4. A positioning device according to claim 1, further comprising:

a first measurement device associated with the base for determining the location of the first arm along the base;

a second measurement device associated with first arm for determining the location of the second arm along the first arm;

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a third measurement device associated with the second arm for determining the pivot of the second arm about the first rotational axis with respect to the first arm;

a fourth measurement device associated with second arm for determining the location of the extending arm along the second arm; and

a fifth measurement device associated with the extending arm for determining
20 the rotation of the extending arm about the second rotational axis with respect to the second arm.

5. A positioning device according to claim 1, further comprising one or more locking devices associated with each of the arms for locking the corresponding locations of each.

5 6. A positioning device according to claim 1, wherein the first and second arms are respectively coupled to the base and first arm using carriages.

7. A positioning device according to claim 1, further comprising a tool holder coupled to an end of the extending arm and configured to hold a tool.

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8. A positioning device according to claim 7, wherein the tool holder is configured to hold a nozzle of a waterjet cutting apparatus for directing a waterjet stream emerging from the nozzle.

15 9. A positioning device according to claim 8, wherein the arms and tool holder of the positioning device are adapted to orient the nozzle for directing the waterjet stream to cut an edge of a nonwoven material.

10. A positioning device for positioning a tool, comprising:
20 a base having a length extending along an x-axis;
a first arm coupled to the base and configured for linear movement along the x-axis;

a second arm coupled to the first arm and configured for linear movement along a y-axis that is perpendicular to the x-axis and parallel to the first arm, and for rotational movement about a first rotational axis parallel to the x-axis; and

an extending arm coupled to the second arm and parallel therewith, and
5 configured for linear movement along a z-axis perpendicular to a plane defined by the x- and y-axes, and for rotational movement about a second rotational axis parallel to the z-axis.

11. A positioning device according to claim 10, further comprising:

10 a first movement device associated with the base and configured to move the first arm along the x-axis;

a second movement device associated with the first arm and configured to move the second arm along the y-axis;

a third movement device associated with the second arm and configured to pivot
15 the second arm about the first rotational axis;

a fourth movement device associated with the second arm and configured to move the extending arm along the z-axis; and

a fifth movement device associated with the extending arm and configured to rotate the extending arm about the second rotational axis;

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12. A positioning device according to claim 11, wherein one or more of the movement device comprise handles associated therewith to implement the corresponding movement device.

- 5 13. A positioning device according to claim 10, further comprising:
- a first measurement device associated with the base for determining the location of the first arm along the base;
 - a second measurement device associated with first arm for determining the location of the second arm along the first arm;
 - 10 a third measurement device associated with the second arm for determining the pivot of the second arm about the first rotational axis with respect to the first arm;
 - a fourth measurement device associated with the second arm for determining the location of the extending arm along the second arm; and
 - a fifth measurement device associated with the extending arm for determining
 - 15 the rotation of the extending arm about the second rotational axis with respect to the second arm.

14. A positioning device according to claim 10, wherein the first and second arms are respectively coupled to the base and first arm using carriages.

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15. A positioning device according to claim 10, further comprising one or more locking devices associated with each of the arms for locking the corresponding locations of each.

5 16. A positioning device according to claim 10, further comprising a tool holder coupled to an end of the extending arm and configured to hold a tool.

17. A positioning device according to claim 16, wherein the tool holder is configured to hold a nozzle of a waterjet cutting apparatus for directing a waterjet
10 stream emerging from the nozzle.

18. A positioning device according to claim 17, wherein the arms and tool holder of the positioning device are adapted to orient the nozzle for directing the waterjet stream to cut an edge of a nonwoven material

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19. A method of positioning a tool, the method comprising:
moving a first arm across a base along a first horizontal axis
moving a second arm across the first arm along a second horizontal axis
extending an extending arm across the second arm along a vertical axis parallel

20 to the second arm; and

pivoting the second arm with respect to the first arm about a first rotational axis parallel to the first horizontal axis;

rotating the extending arm about a second rotational axis parallel to the vertical axis.

20. A method according to claim 19, further comprising:

5 moving the first arm using a first movement device associated with the base;
moving the second arm using a second movement device associated with the first arm;

pivoting the second arm using a third movement device associated with the second arm;

10 extending the extending arm using a forth movement device associated with the second arm; and

rotating the extending arm using a fifth movement device associated with the extending arm.

15 21. A method according to claim 20, wherein one or more of the moving, extending, pivoting, and rotating comprises moving, extending, pivoting, and rotating with handles configured to implement the corresponding movement device.

22. A method according to claim 19, further comprising:

20 measuring a location of the first arm along the base;
measuring a location of the second arm along the first arm;

measuring the pivot of the second arm about the first rotational axis with respect to the first arm;

measuring a location of the extending arm along the second arm; and

measuring the rotation of the extending arm about the second rotational axis

5 with respect to the second arm.

23. A method according to claim 19, further comprising locking the corresponding locations of each of the arms.

10 24. A method according to claim 19, further comprising moving the first and second arms by sliding corresponding carriages coupled thereto across the base and first arm, respectively.

25. A method according to claim 19, further comprising coupling a tool holder to an
15 end of the extending arm, the tool holder configured to hold a tool.

26. A method according to claim 25, wherein coupling comprises coupling a tool holder configured to hold a nozzle of a waterjet cutting apparatus for directing a waterjet stream emerging from the nozzle.

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27. A method according to claim 26, further comprising orienting the nozzle using one or more of the moving, extending, pivoting, and rotating to direct the waterjet stream to cut an edge of a nonwoven material